

27340  
S/080/61/034/009/002/016  
D204/D305

~~SECRET~~  
AUTHORS: Shtrikhman, R.A., Shoykhet, D.N., and Markovskiy, L.Ya.

TITLE: On the primary and secondary processes occurring during the synthesis of zinc-strontium-phosphate phosphor in reducing atmosphere

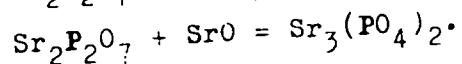
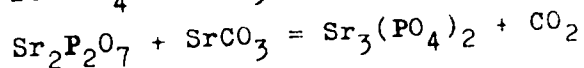
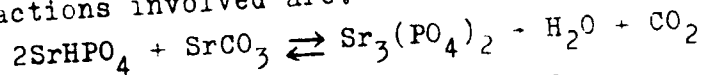
PERIODICAL: Zhurnal prikladnoy khimii, v. 34, no. 9, 1961,  
1912 - 1920

TEXT: This paper reports studies on the primary reaction involved in the formation of the mixed Zn and Sr orthophosphate base and those reactions which are involved in the specific effect of the reducing atmosphere on the phosphor composition. The base composition studied was  $\text{Zn}_{0.44} \text{Sr}_{2.56} (\text{PO}_4)_2$ . Separate components of the charge were roasted in air and consisted of:  $\text{SrHPO}_4$ ,  $\text{SrCO}_3$ ,  $\text{Zn}_3(\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$ . Differential thermal analysis was carried out with a Cr-alumel thermocouple and a multi-point potentiometer type EPP-Card 1/3

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09. The reactions involved are:



In the 3-component mixture, dehydration of the Zn phosphate also occurs. The reducing atmosphere used is a mixture of  $\text{H}_2$  and  $\text{N}_2$ . Heating in  $\text{H}_2$  flow alone causes the product to become blackened and lose luminosity. If subsequently roasted in a neutral gas atmosphere at  $1100^\circ\text{C}$ , the white color of the product is restored. X-ray analysis of products showed that the product obtained by heating in  $\text{H}_2$  (3 - 5 hours) is  $\text{Sr}_3(\text{PO}_4)_2$  with Zn metal impurity, with  $\text{Zn}_3(\text{PO}_4)_2$ . Sr phosphate forms at a temperature of  $900^\circ\text{C}$ , whereas introduction of Zn into the lattice takes place at a higher temperature.

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rature and over a longer period of time. The reducing atmosphere may be  $H_2 + N_2$  or may be an alternating flow of  $H_2 + N_2$  and of  $N_2$ .

The condensate formed during the heating mainly consists of Zn with small amounts of P and  $Zn_3P_2$ . There are 3 tables, 3 figures, and 21 references: 3 Soviet-bloc and 18 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: R.C. Ropp, R.W. Mooney, J. Electroch. Soc., 107, 15, 1960; R.C. Ropp, M.A. Aia, Anal. Chem., 31, 103, 1959; W.L. Wanmaker, B. Bakker, J. Electroch. Soc., 106, 1027, 1959; K.H. Butler, U.S. Patent 2,898,302, 1959.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: November 24, 1960

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15.2670

27911  
S/080/61/034/010/003/016  
D258/D301

**AUTHORS:** Vekshina, N. V., and Markovskiy, L. Ya.

**TITLE:** Some chemical properties of the alkaline-earth hexaborides

**PERIODICAL:** Zhurnal prikladnoy khimii, v. 34, no. 10, 1961, 2171-2175

**TEXT:** The authors studied the chemical reactivity of  $\text{CaB}_6$ ,  $\text{BaB}_6$ , and  $\text{SrB}_6$  produced in the course of an investigation of methods for their preparation (Ref. 11: Zhur. prikladnoy khim. 31, 1958, 1293). The tests employed consisted in treating these compounds with acids and bases and heating them separately with oxygen, nitrogen and carbon. Of these tests, only the oxidation was studied previously. The hexaborides were used in a powdery form (particle size  $\leq 4\mu$ ) and analyzed as follows:  $\text{CaB}_6$  -

38.2% Ca, 61.9% B;  $\text{SrB}_6$  - 57.4% Sr, 42.8% B;  $\text{BaB}_6$  - 67.8% Ba, 31.9% B.

(a) Treatment with acids and bases. The boride (10 g) was added to the

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reagent (250 ml) and the mixture was allowed to stand at room temperature without stirring. The results are given in tabulated form:

| Boride           | Reagent                                   | Percentage of dissolution after: |        |       |        |        |         |
|------------------|---|----------------------------------|--------|-------|--------|--------|---------|
|                  |   | 1 hr.                            | 2 hrs. | 1 day | 2 days | 4 days | 10 days |
| CaB <sub>6</sub> | HCl, d = 1.19                             | 0.5                              | 0.5    | 1.7   | 1.8    | 1.3    | 1.5     |
| "                | H <sub>2</sub> SO <sub>4</sub> , d = 1.84 | did not decompose                |        |       |        |        |         |
| "                | HNO <sub>3</sub> , d = 1.42               | 91.5                             | 97.3   | 100.0 | -      | -      | -       |
| "                | NaOH, 50%                                 | 2.2                              | 2.2    | 2.0   | 2.4    | 2.2    | 2.6     |
| "                | Na <sub>2</sub> CO <sub>3</sub> , 50%     | 0.3                              | 0.4    | 0.4   | 0.2    | 0.3    | 0.5     |
| SrB <sub>6</sub> | HCl, d = 1.19                             | 0.7                              | 0.8    | 1.4   | 1.5    | 1.2    | 1.5     |
| "                | H <sub>2</sub> SO <sub>4</sub> , d = 1.84 | did not decompose                |        |       |        |        |         |
| "                | HNO <sub>3</sub> , d = 1.42               | 98.5                             | 100.0  | -     | -      | -      | -       |

(Table is continued on Card 3)

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|                  |   |      |       |       |                   |     |     |
|------------------|---|------|-------|-------|-------------------|-----|-----|
|                  |   | 0.8  | 1.2   | 1.6   | 1.4               | 1.9 | 1.9 |
| SrB <sub>6</sub> | NaOH, 50%                                 |      |       | 1.3   | 1.5               | 1.5 | 1.5 |
| "                | Na <sub>2</sub> CO <sub>3</sub> , 50%     | -    | -     | 1.6   | 2.0               | 2.9 | 3.0 |
| BaB <sub>6</sub> | HCl, d = 1.19                             | 0.8  | 1.1   |       |                   |     |     |
| "                | H <sub>2</sub> SO <sub>4</sub> , d = 1.84 |      | d i d | n o t | d e c o m p o s e |     |     |
| "                | HNO <sub>3</sub> , d = 1.42               | 94.0 | 98.8  | 100.0 | -                 | -   | -   |
| "                | NaOH, 50%                                 | 1.2  | 1.2   | 1.9   | 1.7               | 1.8 | 1.9 |
| "                | Na <sub>2</sub> CO <sub>3</sub> , 50%     | 0.6  | 1.2   | 1.4   | 1.2               | 1.2 | 1.4 |

No hydrolysis occurred on treating the borides with boiling dil. HCl and no boranes evolved. (b) Stability on heating with O<sub>2</sub>. The compounds were placed in a quartz boat and heated at 500°C to 1200°C in a stream of dry O<sub>2</sub>. Experiments with CrB<sub>2</sub>, TiB<sub>2</sub> and ZrB<sub>2</sub> were included for comparison. Fig. 3 shows a fair rate of oxidation at 650°C and over. Experiments

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conducted at 900°C showed that the oxidation is proceeding at a fair rate during the first 30 min. but attains a limiting value after 2 hours (39% for  $\text{CaB}_6$ , 42% for  $\text{SrB}_6$ , and 46% for  $\text{BaB}_6$ ). This was explained by the formation of a protective film of borates which, however, vanishes at higher temperatures. (c) Stability of heating with carbon and with nitrogen. 1 : 1 mixtures of borides with graphite were heated at 1700°C to 2000°C; also, borides were heated in a stream of  $\text{N}_2$  at 800, 1000, 1200 and 1400°C.

The products were analyzed by chemical and X-ray analysis. No nitrides or boron carbides were shown to be formed. Conclusions: The hexaborides of Ca, Sr and Ba are shown to be even more inert than the borides of transition metals. This fact is said to confirm the author's previously expressed view (Ref. 15: Zhur. neorg. khim. 34, 1957, 2) that the stability of a boride increases with the number of boron atoms contained. There are 3 figures, 1 table and 15 references: 7 Soviet-bloc and 8 non-Soviet-bloc. The reference to the English-language publication reads as follows: H. Moissan, A. Williams, C. r., 125, 629 (1897).

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Some chemical properties...

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: February 28, 1961

Fig. 3. Dependence of the rate of boride oxidation on temperature

A - rate of oxidation (% of oxidized boride within 1 hr.); B - temperature of calcination ( $^{\circ}\text{C}$ ).

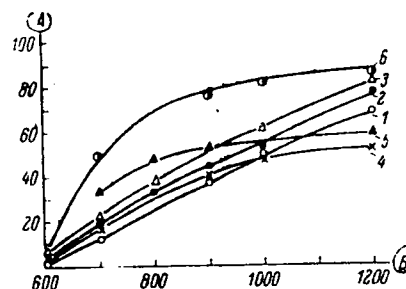


Fig. 3. Зависимость скорости окисления боридов от температуры.

A - скорость окисления (% окислившегося борида за 1 час), B - температура прокаливания ( $^{\circ}\text{C}$ ).

1 - CaB<sub>2</sub>, 2 - SrB<sub>2</sub>, 3 - BaB<sub>2</sub>, 4 - CrB<sub>2</sub>, 5 - TiB<sub>2</sub>, 6 - ZrB<sub>2</sub>.

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3/200/62/000/004/005/012  
1003/1203

AUTHOR: Markovskiy, M.Ya.

TITLE: The chemical stability and structure of borides

PERIODICAL: Porosinkovaya Metallurgiya, no.4, 1962, 33-45

TEXT: The above problem is of great scientific and practical importance but has so far not been explained in detail. The author investigated the hydrolysis of the borides of metals of the II-group of the periodic system and of the transition metals in hot HCl solutions, and their stability in oxygen, nitrogen and carbon at elevated temperatures. The conclusion is drawn that the strength of the boron-boron and boron-metal bonds is greatly influenced by the crystal structure of the borides, and increased with the content of boron in the compound. There are 6 figures and 2 tables.

ASSOCIATION: Gossudarstvennyy Ordena Trudovogo Arashego Zr. and Institut prikladnoi khimii (The Government Order of the Red Banner of Labour

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The chemical stability...

Institute of Applied Chemistry, Leningrad)

S/266/62/000/004/005/012

ICU3/1203

SUBMITTED: January 15, 1962

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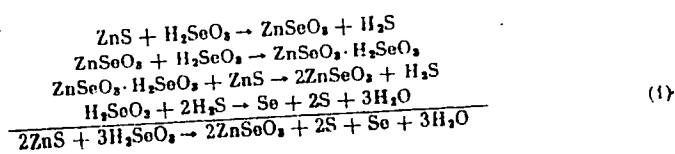
S/078/62/007/003/005/019  
B110/B138

AUTHORS: Markovskiy, L. Ya., Smirnova, R. I.

TITLE: Reactions accompanying the production of zinc selenide by interaction of zinc sulfide with selenous acid

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 3, 1962, 540 - 548

TEXT: In previous papers (Zh. neorg. khimii, 2, 2752 (1957); ibid., 5, 2042 (1960); Tr. gos. in-ta prikl. khimii, 43, 128 (1960)), the authors had studied the following reactions between an aqueous suspension of ZnS and  $H_2SeO_3$ :

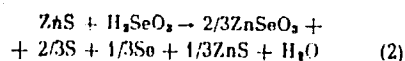


The reactions taking place in the roasting charge are examined more closely here. The orange-colored mass obtained by the strongly exothermic reaction  
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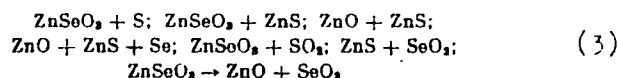
Reactions accompanying the...

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B110/B138

of ZnS (Zn 66.1% and S 32.2%) and  $H_2SeO_3$  (~20 g of  $SeO_2$  per 100 g of  $H_2O$ ) was dried at 100 - 120°C. The heating curves were taken on an FPK-54 (FPK-54) pyrometer at a heating rate of 15 - 20°C/mm. The powder patterns of the roasted powder were taken with Fe  $K_\alpha$  radiation. Taking the ratio of 1 mole of ZnS/1 mole of  $H_2SeO_3$ , which is the optimum in ZnSe production, the reaction reads:



Heating curves with the ratios  $ZnS : H_2SeO_3 = 1:1$  and  $2:3$  display endothermic melting effects at 120°C for S and 220°C for Se and strong exothermic effects at ~400°C. Here,  $ZnSeO_3$  is probably reduced by S or ZnS as follows:



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Reactions accompanying the...

As the  $\text{SeO}_2$  content of the charge rises, so also do the percentage of Se sublimation, and the Zn content in the solid phase.  $\text{ZnS} : \text{H}_2\text{SeO}_3 = 1 : 1$  yields the maximum ZnSe content. Further increase in  $\text{H}_2\text{SeO}_3$  causes a decrease in ZnSe.  $\text{ZnS} : \text{H}_2\text{SeO}_3 = 2 : 3$  (63% by weight of  $\text{SeO}_2$ ) yields ZnO (~0.1% of Se). This can be attributed to the oxidizing effect of the  $\text{SeO}_2$  which is formed at or above  $600^\circ\text{C}$ . If ZnSe mixed with  $\text{ZnSeO}_3$  or  $\text{ZnSO}_4$  is roasted at  $800^\circ\text{C}$ , starting from  $600^\circ\text{C}$  it is almost quantitatively transformed to ZnO. The exothermic effect at  $600^\circ\text{C}$  is based on ZnSe oxidation, and the endothermic at  $\sim 700^\circ\text{C}$  on Se evaporation.  $2 \text{ZnSeO}_3 + 3\text{S}$  roasted in  $\text{N}_2$  atmosphere for 30 min yielded 20.0% ZnSe at  $400^\circ\text{C}$ , 67.2% at  $600^\circ\text{C}$  and 69.1% at  $800^\circ\text{C}$ . The ZnS, also formed at  $400^\circ\text{C}$ , results from the secondary reaction:  $\text{ZnSe} + \text{S} \rightarrow \text{ZnS} + \text{Se}$ ;  $\text{ZnSO}_4$  forms in a yield of 30% after 30 min roasting of  $\text{ZnSeO}_3$  at  $450 - 500^\circ\text{C}$  in  $\text{SO}_2$  atmosphere according to the reaction  $2\text{ZnSeO}_3 + 2\text{SO}_2 \rightarrow 2\text{ZnSO}_4 + \text{Se} + \text{SeO}_2$ . At  $800^\circ\text{C}$ , it changes into

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Reactions accompanying the...

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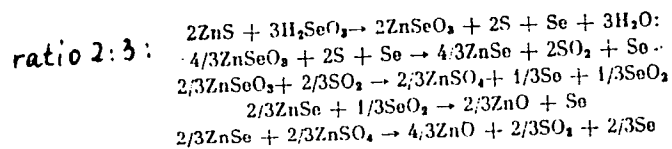
ZnO via oxysulfate. Zinc sulfite reacts with zinc selenite according to  

$$\text{ZnS} + 2\text{ZnSeO}_3 \longrightarrow 2\text{ZnO} + \text{ZnSO}_4 + 2\text{Se}$$
 at 20% selenite content and  $\text{ZnS} + \text{ZnSeO}_3 \longrightarrow \text{ZnSe} + \text{ZnO} + \text{SO}_2$  at 450°C. Since  $2\text{ZnO} + \text{ZnS} \longrightarrow 3\text{Zn} + \text{SO}_2$  is only thermodynamically possible above 1500°C, SO<sub>2</sub> and ZnSe formation (140 and 38 kcal, respectively) can only be achieved by adding Se. Most of the ZnO is therefore converted into ZnSe. In  $2\text{ZnSeO}_3 + 2\text{S} + \text{Se}$ , ZnS binds the formed ZnO. Therefore, in the ratio  $\text{ZnS} : \text{H}_2\text{SeO}_3 \gg 1$ , only slight ZnO impurities are formed, which do not influence the luminescence properties of commercial sulfide selenide luminophores. Without Se, ZnO will form by sublimation with a slow temperature rise. Forced temperature rise and average charges are therefore best:

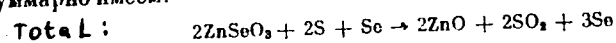
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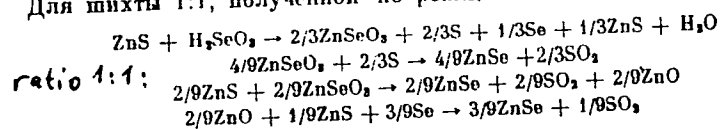
Reactions accompanying the...



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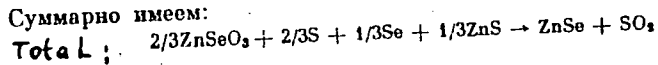


Для шихты 1:1, полученной по реакции



(4)

Суммарно имеем:



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Reactions accompanying the...

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B110/B138

The side reactions modifying these "ideal schemes" depend on experimental conditions. M. Z. Aleksandrova is thanked for assistance in the experiments. There are 3 figures, 7 tables, and 13 references: 9 Soviet and 4 non-Soviet. The reference to the English-language publication reads as follows: G. Crosby, U. S. Patent 2818391, December 31, 1957.

ASSOCIATION: Gosudarstvenny institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: November 1, 1960

Card 6/6

SMIRNOVA, R.I.; MARKOVSKIY, L.Ya.

Reactions taking place in the interaction of cadmium sulfide  
dry powders with selenious anhydride. Zhur.neorg.khim. 7  
no.6:1366-1369 Je '62. (MIRA 15:6)  
(Cadmium sulfide) (Selenium oxide)

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15.2260

32392  
S/080/62/035/001/002/013  
D245/D304

AUTHORS: Vekshina, N. V. and Markovskiy, L. Ya.

TITLE: Study of reactions taking place during the preparation of hexaborides of alkaline-earth metals by reduction with carbon

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 1, 1962, 30-37

TEXT: Using chemically pure materials, the authors made a detailed series of studies of the reactions which occur during the preparation of Ca, Ba and Sr hexaborides by heating mixtures of varying composition of the oxides with graphite and B. The primary sinter, liquid and gaseous products of hydrolysis and insoluble residues were analyzed. The possible interactions are discussed. Using a charge of optimum composition ( $\text{CaO} + 3\text{B}_2\text{O}_3 + 5\text{C}$ ), it was found that, up to  $1500^\circ\text{C}$ , the only reaction was between the metal oxide and boron to form borates. Reduction with C commenced at  $1700^\circ$  but, at this temperature, the products were boron carbide and graphite. The optimum temperature for the formation of hexaborides was found

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Study of reactions ...

to be 1900°C. The tendency to form  $MC_4B_2$  increases from Ca to Sr to Ba. Optimum conditions for obtaining nearly stoichiometric yields of the hexaborides are shown in tabulated form. There are 1 figure, 4 tables and 8 references: 5 Soviet-bloc and 3 non-Soviet-bloc. The references to the English-language publications read as follows: H. Blumenthal, *Powd. Metal. Bull.*, v. 7, 79, 1956; A. Stock, 'Hydrides of Boron and Silicon' (1933); P. Blum and F. Bertaut, *Acta Cryst.*, v. 7, 81, (1954). X

ASSOCIATION: Gosudarstvenny institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: April 5, 1961

Card 2/2

212400

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11240

S/080/62/035/003/004/024  
D258/D302

AUTHORS: Markovskiy, L. Ya. and Bezruk, Ye. T.

TITLE: The chemical stability of some transitional metal  
borides (II)

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 3, 1962, 461-466

TEXT: In continuation of earlier work the authors studied the chemical stability towards acid hydrolysis of the different borides of Mn, Cr, Fe, Ni and Co to establish a relationship between boride stability towards hydrolysis and boron contents of the compound. To this end,  $Mn_2B$ ,  $MnB$ ,  $Mn_3B_4$ ,  $MnB_2$ ,  $FeB$ ,  $Fe_2B$ ,  $CoB$ ,  $Co_2B$ ,  $Co_3B$ ,  $NiB$ ,  $Ni_4B_3$ ,  $Ni_2B$ ,  $Ni_3B$ ,  $CrB$ ,  $Cr_5B_3$  and  $Cr_2B$  were synthesized from the elements, treated with a 1:2 HCl solution, and their reaction products analyzed for diborane, tetraborane and hydrogen. It was shown that boranes and hydrogen were formed in each case. The gradual increase of B contents in every group is connected with a sharp decrease in the rate of decomposition, as well as in borane formation.

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The chemical stability ...

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The stability of isostructural borides increased from Cr to Ni. The increased stability of boron-rich compounds was interpreted in terms of correspondingly increasing strength of B-B bonds. There are 2 figures, 6 tables and 20 references: 10 Soviet-bloc and 10 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: Binder and B. Post, Acta crystallograph., 13, 356, (1960); S. Rundqvist, Acta chem. Scand., 13, 1196, (1959); H. Blumenthal, Powder Metal. Bull., 6, 48, (1951); A. Newkirk and D. Hurd, J. Am. Chem. Soc., 77, 241, (1955).

SUBMITTED: April 5, 1961

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S/080/62/035/004/002/022  
D204/D301

11.2221

AUTHORS: Markovskiy, L. Ya. and Kaputovskaya, G. V.

TITLE: Certain chemical properties of Mg borides and their role in preparing elemental B by a magnesiothermal method

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 4, 1962, 723-729

TEXT: The interactions of Mg borides with aerial  $O_2$ ,  $N_2$  and C were studied. Preparation and analysis of the borides and of amorphous B, which was also tested for oxidation resistance, are briefly mentioned. 1-g-samples of the powdered materials (99-100%  $<10\mu$ ) were pressed into quartz tubes open at one end (15 mm dia.) and were oxidized in a slow current of air between 400 - 600°C, for 0 - 15 hours. It was found that oxidation resistance decreased in the order  $MgB_{12} > MgB_6 > MgB_4$ , the higher borides being unaffected up to 550 - 575°C. Short-period oxidation (15 min.) at 500 - 600°C, followed by extraction with 1:1 HCl showed that Mg was attacked in

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3204/0301

preference to B, owing to a deficiency of surface  $B_2O_3$  which prevented the formation of a protective oxide layer. Absence of the latter tended to reduce the long term (15 hrs) stability of  $MgB_{12}$  and  $MgB_6$  towards oxidation, in comparison with  $MgB_2$  and  $Mg_2B_3$  which oxidized more rapidly at first. No Mg nitrides were formed. Resistance to O-free  $N_2$  was studied over 2 - 3 hours between 600 - 1550°C and was found to be high, especially for the higher borides. No interaction with graphite was detected up to 1800°C. A discussion is next given of the magnesiothermal production of amorphous B, showing that 'Moissan's boron' consists of  $MgB_{12}$  containing 20% of B and B suboxides, probably as a solid solution. This is followed by consideration of the role of  $MgB_{12}$  in purifying B by vacuo-thermal and selective oxidation methods. The help of Yu. D. Konirashov with the X-ray work is acknowledged. There are 6 figures, 4 tables and 15 references: 11 Soviet-bloc and 4 non-Soviet-bloc. The references to the English-language publications read as follows: M. Jones,

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Certain chemical properties ...

S/000/62, 035/004, 002 0.2  
D204/D301

K. Marsh, J. Am. Chem. Soc., 76, 1434, (1954); A. King, P. ...  
V. Russel, J. Am. Chem. Soc., 78, 4176, (1956).

SUBMITTED: March 1, 1961

Card 3/3

BABITSKAYA, R.A.; MARKOVSKIY, L.Ya.

Some results of the study of the phase composition and  
luminescent properties of the system  $\text{Zn}_3(\text{PO}_4)_2 - \text{Sr}_3(\text{PO}_4)_2$ .  
Zhur.prikl.khim. 35 no.7:1434-1441 J1 '62. (MIRA 15:8)  
(Zinc phosphate) (Strontium phosphate)  
(Luminescent substances)

S/080/62/035/009/011/014  
D287/D307

AUTHORS: Markovskiy, L.Ya., Vekshina, N.V., and Pron', G.F.

TITLE: The formation of boron carbides during the reduction of rare earth metal oxide mixtures and of boron with carbon

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 9, 1962,  
2090 - 2091

TEXT: The present work is a continuation of earlier investigations carried out by the authors on the formation of lanthanide borides and on metal - boron - carbon systems. Experiments on the C-reduction of mixtures containing  $CeO_2$  or  $La_2O_3$  and  $B_2O_3$  were carried out at temperatures between 1900 and 2000°C, under the conditions described earlier. The reduction products were found to contain a considerable quantity of a chemically unstable product; hydrolysis of the latter induced the following reactions: B and the metal went into solution, C and a certain percentage of B formed polymeric organic compounds. These results, as well as x-ray data from preliminary investigations, proved that boron carbides were formed in the Card 1/2

✓

The formation of boron carbides ...

S/080/62/035/009/011/014  
D287/D307

systems Ce-B-C and La-B-C and that the properties of the compounds were similar to the characteristics of boron carbides of alkaline earth metals. There is 1 table.

SUBMITTED: December 18, 1961

Card 2/2

L 12675-63

ACCESSION NO: AP/000643

ENT(1)/BDS AFFTC/AED/SSD

6/0000/65/055/005/0530/0556

AUTHOR: Kolpakova, A. A., Markovskiy, L. Ya.

54  
52

TITLE: Luminescent properties of BaO-SiO sub 2 systems activated by cerium and manganese

SOURCE: Zhurnal prikladnoy khimii, v. 36, no. 3, 1963, 550-556

TOPIC TAGS: Ba-silicates, cerium, manganese, luminescence, luminophores

ABSTRACT: An investigation of the luminescent properties of Ba silicates activated by the combined action of trivalent Ce and Mn showed luminescence dependent upon phase transitions of the silicate. Ba sub 3 SiO sub 5 and Ba sub 2 SiO sub 4 are not luminescent; Ba sub 3 SiO sub 3 has a very weak, and Ba sub 2 Si sub 3 O sub 8 a strong light blue,  $\lambda = 440$ -millimicron emission; and BaSi sub 2 O sub 5 and compositions richer in SiO sub 2 (BaSi sub 2 O sub 5 admixed with SiO sub 2) give a di-banded white luminosity,  $\lambda = 400$  and  $\lambda = 500$  millimicrons. X-rays indicated no Ce or Mn silicates were formed. In the transition phases from Ba sub 2 Si sub 3 O sub 8 to BaSi sub 2 O sub 5 where x-rays showed BaSi sub 2 O sub 5 - blue caused by traces, not detected by x-rays of Ba sub 2 Si sub 3 O sub 8 - Ce, Mn, as confirmed by mechanical mixtures of the former with 5-10% of the latter

Card 1/2



12673-63  
EXHIBIT NO: AP3000643

2  
silicate. Extensive study was made to determine the optimum roasting temperature, effect of BaF sub 3 and BaCl sub 2 as flux, and concentration of activators for the preparation of these luminophores; 1100° with 3% BaCl<sub>2</sub> flux and 10% CeO<sub>2</sub> plus 1.4% Mn. The emission of the luminophore Ba sub 2 Si sub 3 O sub 8 - Ce, Mn is not more than 35% than emission from ZnS - Ag and 30% greater than from MgWO sub 4. In conclusion the authors express their appreciation to Ya. D. Kondrashev for conducting x-ray structural analyses of test specimens. Orig. art. has: 3 tables, 6 figures.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: 27Jan62

DATE ACQ: 12Jan63

ENCL: 00

SUB CODE: CH

NO REF SOV: 007

OTHER: 015

Card 2/2

BABITSKAYA, R.A.; MARKOVSKIY, L.Ya.

Phase composition and luminescent properties of the system  
 $\text{Zn}_3(\text{PO}_4)_2 - \text{Ca}_3(\text{PO}_4)_2$ . Zhur.prikl.khim. 36 no.6:1186-1192  
Je '63. (MIRA 16:4)

1. Gosudarstvennyy institut prikladnoy khimii.  
(Zinc phosphates) (Calcium phosphates) (Luminescence)



MIRONOV, I.A.; MARKOVSKIY, L.Ya.

Electroluminescent properties of luminophors on the basis of zinc-cadmium-sulfoselenides. Opt. i spektr. 16 no.2:285-289 P '64.  
(MIRA 17:4)

ACCESSION NR: AP4024765

S/0080/64/037/003/0492/0497

AUTHOR: Mironov, I. A.; Markovskiy, L. Ya.

TITLE: The influence of oxygen on the luminescent properties of nonactivated zinc selenide

SOURCE: Zhurnal prikladnoy khimii, v. 37, no. 3, 1964, 492-497

TOPIC TAGS: Oxygen, luminescent property, zinc selenide, radiation, solubility, Zn Se luminescence, ZnO

ABSTRACT: The purpose of the work is accurately to define the effect of oxidizing agents on ZnSe luminescence. In particular, the problem of determining the minimum quantities of oxygen which cause a change in luminescent properties, and establish the nature of these changes was raised. It was necessary to develop a special method for this in order to determine the low quantities of oxygen in zinc selenide. (Figure 1 Enclosure) Data indicated that the presence of oxygen in zinc selenide shows up in the luminescent properties of a self-activated luminophore. This is combined with the formation of zinc oxide on the surface of the zinc selenide grain; the zinc oxide being formed is activated by the selenium and its luminescence

Cord 1/3

ACCESSION NR: AP4024765

( $\lambda_{\text{max.}} = 610-620 \text{ m}\mu$ ) is added to the zinc selenide luminescence. The displacement of a maximum of radiation as a result of ZnSe oxidation can take place only when the original zinc selenide has a low luminescence brightness. Then the relation of intensive luminescence of ZnSe and ZnO. Se can reach a point where the maximum of the integral curve is moved to the short-wave side (in the extreme case up to  $610-620 \text{ m}\mu$ ). Based on data obtained, it is possible to assume that solubility of oxygen in zinc selenide does not exceed 0.1 weight % in every case. However, this value of solubility should first be examined since more accurate formulation of the experiment is required in order to determine true solubility. Orig. art. has: 5 figures, 3 tables.

ASSOCIATION: none

SUBMITTED: 06May63

DATE ACQ: 16Apr64

ENCL: 001

SUB CODE: CH, EL

No. REF. SOV: 008

OTHER: 004

Card 2/3

ACCESSION NR: AP4024765

ENCLOSURE: 01

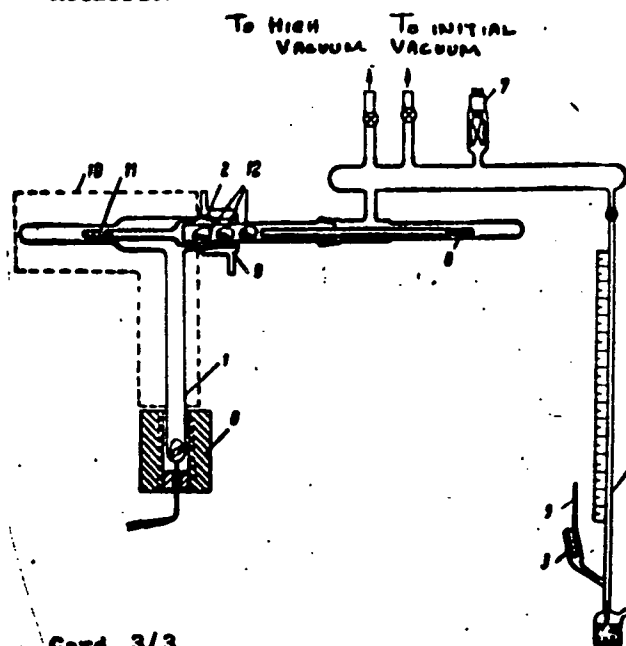


Fig. 1

Diagram of instrument to determine microquantities of oxygen in zinc selenide

- 1- quartz reaction vessel
- 2- magnet controlled section
- 3- branch for freezing out the gas with a capillary 5 -of a certain volume
- 4-mercury manometer
- 6-furnace at 1100C
- 7-thermocouple manometric tube
- 8, 11-magnetic rods
- 9- water cooler
- 10 - capacity heated to 450-500C
- 12- crucibles with batches of analyzed material

Card 3/3

1 10540-65 EWT(1)/EBC(b)-2 IJP(c)

ACCESSION NR: AT4044996

5/3110/64/000/051/0075/0082

AUTHOR: Orshanskaya, N. S.; Markovskiy, L. Ya.

TITLE: The problem of the nature of the yellow and green luminescence of activator-free zinc oxide

SOURCE: Leningrad. Gosudarstvennyy Institut prikladnoy khimii. Trudy\*, no. 51, 1964. Khimiya i tekhnologiya lyuminoforov (Chemistry and technology of luminophors), 75-82

TOPIC TAGS: luminophor, zinc oxide, zinc oxide luminescence, activator-free zinc oxide

ABSTRACT: After a short discussion on the nature of ZnO luminescence, the authors present data obtained in a study of the orange and green luminescence of zinc oxide and its dependence on the conditions of formation of the luminophor. The preparations were synthesized in vessels made of clear quartz, and heating was carried out in electric ovens. The luminescence characteristics were measured either in a cathode-ray tube or with ultraviolet excitation ( $\lambda = 365 \text{ m}\mu$ ) on an instrument composed of a UM-2 monochromator, an FEU-17 photomultiplier and a GZS-17 galvanometer. The results showed that a preparation obtained by heating zinc acetate in air at 800C does not luminesce. After addition of 5% S or Se and

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L-10540-65

ACCESSION NR: AT4044996

heating at 800C, the zinc oxide acquires a green ( $\lambda = 510 \text{ m}\mu$ ) or orange ( $\lambda = 600 \text{ m}\mu$ ) luminescence, respectively. ZnO obtained from zinc nitrate and containing small amounts of NO<sub>2</sub>-ions acquires an orange luminescence ( $\lambda = 540$  and  $600 \text{ m}\mu$ ) when heated at 500C and 800C. Addition of S, Se, or C produces a green or orange luminescence with  $\lambda_{\text{max}}$  of 510, 600, and 530 m $\mu$ , respectively. Experiments with zinc oxide obtained from the oxidation of metallic zinc showed that ZnO obtained in such a manner and heated in the presence of air or oxygen at various temperatures (800-1050C) has a green luminescence which changes to orange with increasing temperature (1050C). Zinc oxides obtained from oxidation of luminophor-pure zinc sulfide in air at 800C have maximal luminosity, but luminophors obtained from the oxidation of metallic zinc have a luminosity several times higher than zinc oxides obtained by the precipitation of hydrates of zinc oxide. Experiments with samples of zinc oxide exhibiting orange luminescence, and heated in the presence of a mixture of nitrogen and hydrogen at 500 and 800C for 30 minutes, showed that the long-wave band disappears in preparations of self-activated zinc oxides; in contrast to ZnO-Se, X-ray analysis showed no differences in the structure of preparations with green or orange luminescence. Orig. art. has: 5 tables and 2 figures.

ASSOCIATION: Gosudarstvennyy Institut prikladnoy khimii, Leningrad (State

Card 2/3

1-10540-65  
ACCESSION NR: AT4044996  
Institute for Applied Chemistry)  
SUBMITTED: 00 ENCL: 00 SUB CODE: IC, DP  
NO REF SOV: 007 OTHER: 003  
Card 3/3

ACCESSION NR: AT4044998

S/3110/64/000/051/0102/0106

AUTHOR: Kolpakova, A. A., Markovskiy, L. Ya.

TITLE: Luminescent properties of the magnesium silicate system after activation with cerium and manganese

SOURCE: Leningrad. Gosudarstvennyy institut prikladnoy khimii. Trudy\*, no. 51, 1964. Khimiya i tekhnologiya lyuminoforov (Chemistry and technology of luminophors), 102-106

TOPIC TAGS: luminophor, magnesium silicate, activated magnesium silicate, silicate luminescence, cerium, manganese, luminescence spectrum, absorption spectrum

ABSTRACT: The phase composition of the  $\text{MgO-SiO}_2$  system, which is important in the manufacture of ceramics and refractory materials, has been studied in detail, but its luminescent properties are insufficiently understood. The authors therefore studied the relationship between phase composition and luminescence in the  $\text{MgO-SiO}_2$  system after activation with  $\text{CeO}_2$  (5 wt. %) and/or  $\text{MnCl}_2 \cdot 4 \text{H}_2\text{O}$  (1%) by x-ray and spectroscopic analysis of samples with varying composition (in steps of 5 mol. %). In order to achieve equilibrium, the luminophor was heated for 20 hrs. at  $1200^\circ\text{C}$  in the presence of  $\text{MgF}_2$

Card 1/3

ACCESSION NR: AT4044998

before activation. The effect of the activating elements on the luminescence and absorption spectra are shown in Fig. 1 of the Enclosure. The experimental data show that the  $Mg_2SiO_4$  phase does not show luminescence when activated with Ce alone, and produces only a very faint dark-red light in the presence of Mn. The  $MgSiO_3$  phase also produces very faint luminescence when activated with either Mn (red light) or Ce (blue light) alone, but in the presence of both Mn and Ce the luminescence shows two peaks (390 and 670  $m\mu$ ). The strongest luminescence was produced by activated lumino-phors containing excess  $SiO_2$ , which apparently facilitates the formation and activation of protoenstatite. "Yu. D. Kondrashev participated in the x-ray studies." Orig. art. has: 1 table and 2 figures.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii, Leningrad (State Institute of Applied Chemistry)

SUBMITTED: 00

ENCL: 01

SUB CODE: IC

NO REF SOV: 007

OTHER: 010

Cord 2/3

ACCESSION NR: AT4044998

ENCLOSURE: 01

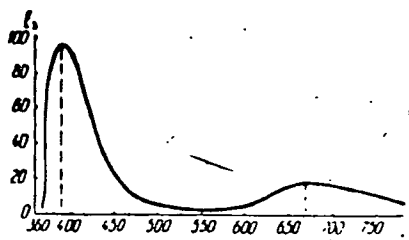


Fig. 1a. Spectral composition of the luminescence from a  $\text{MgSiO}_3 \cdot \text{Ce}^{+++} \cdot \text{Mn}^{++}$  luminophor (5%  $\text{CeO}_2$  and 1% Mn).

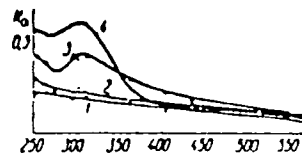


Fig. 1b. Dependence of the absorption spectrum of  $\text{MgSiO}_3$  on the presence of activators:  
1 -  $\text{MgSiO}_3$  without activators;  
2 -  $\text{MgSiO}_3 \cdot \text{Mn}^{++}$ ; 3 -  $\text{MgSiO}_3 \cdot \text{Ce}^{+++}$ ; 4 -  $\text{MgSiO}_3 \cdot \text{Mn}^{++} \cdot \text{Ce}^{+++}$ .

Card 3/3

ACCESSION NR: AP4043336

S/0181/64/006/008/2245/2248

AUTHORS: Mironov, I. A.; Markovskiy, L. Ya.

TITLE: Nature of luminescence of activator-free zinc selenide

SOURCE: Fizika tverdogo tela, v. 6, no. 8, 1964, 2245-2248

TOPIC TAGS: zinc compound, luminor, luminescence, photoluminescence spectrum, emission spectrum, luminescence center

ABSTRACT: In view of the insufficient understanding of the nature of the luminescence of luminors based on zinc selenide, the present investigation is devoted to a study of the nature of different bands in the emission spectrum of a pure activator-free zinc selenide. To this end, the zinc selenide was processed in zinc and selenium vapor, and the photoluminescence spectra were investigated at low temperatures. The signs of the photocurrent carriers were also determined. Non-activated zinc selenide heated in vacuum was also tested. It is

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ACCESSION NR: AP4043336

shown that the green glow observed at low temperatures is connected with the penetration of selenium atoms into the crystal lattice of the zinc selenide, while the red glow is connected with penetration of zinc atoms. The experimental procedure is briefly described. The experimental facts show that two types of luminescence centers can exist in the zinc selenide. In addition, there is also a blue band at a temperature -196C, consisting of several narrow bands. It is produced by the excitons which arise following ultraviolet irradiation of the zinc selenide. Differences between the present results and those obtained by others are explained. "In conclusion, we are grateful to F. M. Pekerman and Ya. A. Oksman for many valuable advices." Orig. art. has: 4 figures.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii, Leningrad  
(State Institute for Applied Chemistry)

SUBMITTED: 06Dec63

ENCL: 00

SUB CODE: OP

NR REF SOV: 007

OTHER: 007

Card 2/2

ACCESSION NR: AP4029184

S/0078/64/009/004/0849/0855

AUTHOR: Sapozhnikov, Yu. P.; Markovskiy, L. Ya.

TITLE: Reduction of zinc selenite with hydrogen

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 4, 1964, 849-855

TOPIC TAGS: zinc selenite, reduction, hydrogen reduction, zinc selenide, preparation, beta-zinc selenite, thermal dissociation, two stage reduction, zinc selenide contamination

ABSTRACT: The hydrogen reduction of zinc selenite in small batches in the 300-1100C range was investigated to determine conditions for obtaining zinc selenide free of oxide impurities. Factors controlling the possibility of preparing ZnSe are the relative rates of the reactions of zinc selenite reduction with hydrogen, the diffusion of the hydrogen through the selenite powder, and the thermal dissociation of  $\beta$ -ZnSeO<sub>3</sub>. The latter plays a particularly important role in that it prevents obtaining oxide-free ZnSe and complicates the reduction

Card 1/2



ACCESSION NR: AP4029184

of the selenite with a series of side reactions, causing formation of Se and  $H_2Se$ . Almost pure ZnSe, containing 0.2-0.3% ZnO can be obtained only by reducing thin layers of the selenite under rapid hydrogen flow at 800-1000C. The ZnSe yield however is only 20-50%. Increasing the thickness of the selenite layer lowers yield. Two-step reduction does not eliminate the problems. The low effectiveness of this method for preparing ZnSe does not make it practical as a production method. Orig. art. has: 3 tables and 1 figure

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: 12Apr63

DATE ACQ: 28Apr64

ENCL: 00

SUB CODE: CH

NO REF SOV: 011

OTHER: 004

Card 2/2

ACCESSION NR: AP4029185

S/0078/64/009/004/0856/0866

AUTHOR: Markovskiy, L. Ya.; Sapozhnikov, Yu. P.; Boyev, E. I.

TITLE: Bismuth Selenites

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 4, 1964, 856-866

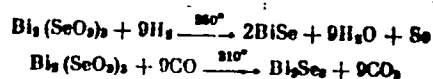
TOPIC TAGS: bismuth selenite, synthesis, composition, thermal stability, Bi sub 2 (SeO sub 3) sub 3, bismuth selenite, bismuth selenite monohydrate, Bi sub 2 (SeO sub 3) sub 3.H sub 2 O, Bi sub 2 (SeO sub 3) sub 3.H sub 2 SeO sub 3, Bi sub 2 (SeO sub 3) sub 3.SeO sub 2, Bi sub 2 O sub 3.SeO sub 2, Bi(NO sub 3)SeO sub 3, Bi sub 2(SO sub 4) (SeO sub 3) sub 2, Bi(CH sub 3COO)SeO sub 3, thermogram, bismuth selenide, BiSe, Bi sub 2Se sub 3, selenious acid, crystal microphotograph, x ray analysis

ABSTRACT: The conditions for synthesizing bismuth selenites, their phase composition and thermal stability were investigated. Reactions between  $H_2SeO_3$  and bismuth nitrate, sulfate, acetate, chloride, suspensions of bismuth oxides, hydroxide, basic carbonate and citrate were run. The existence of the neutral selenite  $Bi_2(SeO_3)_3$ , its monohydrate  $Bi_2(SeO_3)_3 \cdot H_2O$  and its crystalline acid salt

Card 1/8

ACCESSION NR: AP4029185

$\text{Bi}_2(\text{SeO}_3)_3 \cdot \text{H}_2\text{SeO}_3$  was confirmed.  $\text{Bi}_2(\text{SeO}_3)_3$  is best prepared by reaction of selenious acid with bismuth nitrate or citrate. Two new selenites  $\text{Bi}_2(\text{SeO}_3)_3 \cdot \text{SeO}_3$  and  $\text{Bi}_2\text{O}_3 \cdot \text{SeO}_2$  were identified, as well as selenite double salts with nitric, sulfuric and acetic acids:  $\text{Bi}(\text{NO}_3)\text{SeO}_3$ ,  $\text{Bi}_2(\text{SO}_4)(\text{SeO}_3)_2$ ,  $\text{Bi}(\text{CH}_3\text{COO})\text{SeO}_3$ . Microphotographs of these various selenites are shown. X-ray data is given. The thermal stability of these selenites was investigated (thermograms are shown in figs. 1-6) and explanations are given for the various endothermic and exothermic effects observed. The bismuth selenides  $\text{BiSe}$  and  $\text{Bi}_2\text{Se}_3$  are formed on heating the neutral or acid bismuth selenites in hydrogen or carbon monoxide:



Orig. art. has: 8 figures, 4 tables and 2 equations.

Card 2/8

ACCESSION NR: AP4029185

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: 13Aug62

DATE ACQ: 29Apr64

ENCL: 05

SUB CODE: GC

NO REF SOV: 008

OTHER: 010

Card 3/8

ACCESSION NR: AP4029185

ENCLOSURE: 01

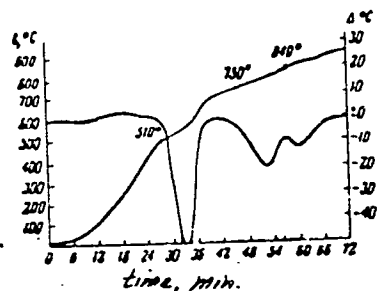


Fig. 1. Heat curve for the neutral bismuth selenite  $\text{Bi}_2(\text{SeO}_3)_3$  I and  $\text{Bi}_2(\text{SeO}_3)_3$  II.

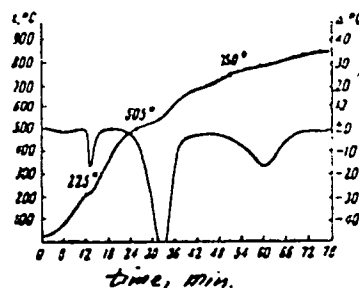


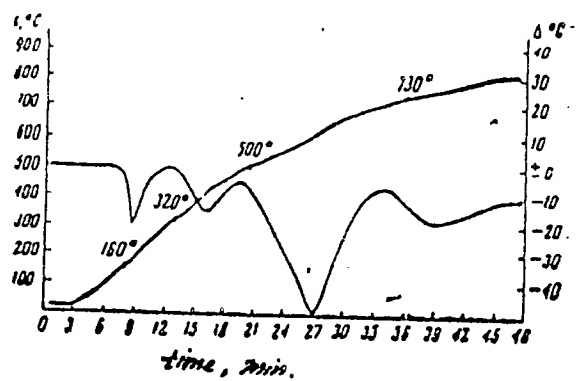
Fig. 2. Heat curve for the neutral bismuth selenium oxide  $\text{Bi}_2(\text{SeO}_3)_3 \cdot \text{H}_2\text{O}$

Card 4/8

ACCESSION NR: AP4029185

ENCLOSURE: 02

Fig. 3. Heat curve for the acid selenium oxide  $\text{Bi}_2(\text{SeO}_3)_3 \cdot \text{H}_2\text{SeO}_3$ .

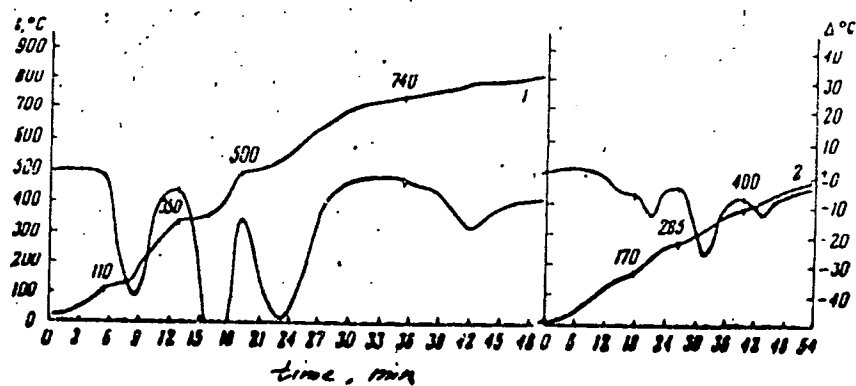


Card 5/8

ACCESSION NR: AP4029185

ENCLOSURE: 03

Fig. 4. Heat curves for the  $\text{Bi}(\text{NO}_3)_3\text{SeO}_3$  double salt (1) and bismuth nitrate (2)

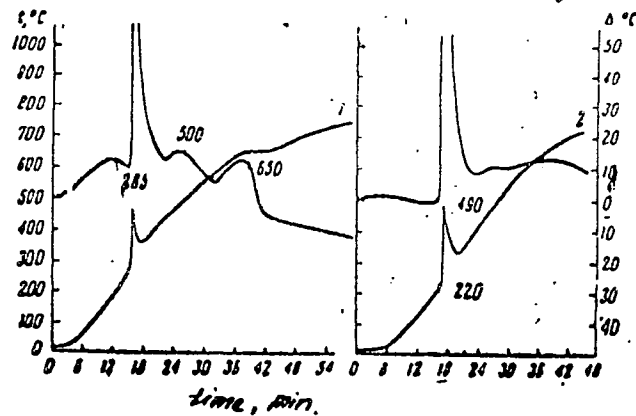


Card 6/8

ACCESSION NR: AP4029185

ENCLOSURE: 04

Fig. 5. Heat curves for the bismuth selenite-acetate double salt  $\text{Bi}(\text{CH}_3\text{COO})\text{SeO}_3$  (1) and mixtures of bismuth acetate and bismuth selenite (2) (1:1)



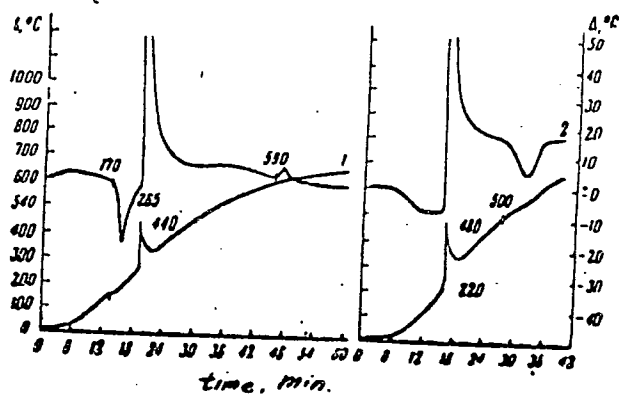
Card 7/8



ACCESSION NR: AP4029185

ENCLOSURE: 05

Fig. 6. Heat curves for the bismuth selenite-citrate double salt (1) and mixtures of bismuth citrate with bismuth selenite (2) (1:1)



Card 8/8

SAPOZHNIKOV, Yu.P. & MARKOVSKIY, L.Ya.

Studying the phase composition and thermal stability of acid zinc selenites. [Trudy] SIKKH no.51:20-29 '64.

Reduction of mercury selenite with hydrogen. Ibid.:30-33

(MIRA 18:5)

ACCESSION NR: AP4036964

S/0078/64/009/005/1129/1133

AUTHOR: Smirnova, R. I.; Markovskiy, L. Ya.

TITLE: Reaction of divalent mercury sulfide with selenious anhydride and selenious acid.

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 5, 1964, 1129-1133

TOPIC TAGS: mercuric sulfide, mercuric selenide, selenium dioxide, selenious acid, mercuric selenide synthesis, production

ABSTRACT: The possibility of producing HgSe by the reaction of HgS with selenium dioxide or with selenious acid was investigated. The overall reaction  $\text{HgS} + \text{SeO}_2 \longrightarrow \text{HgSe} + \text{SO}_2 + 11.1 \text{ kcal}$  starts at about 200C and is almost quantitatively completed in 3 to 5 seconds. It is suggested the reaction proceeds in two stages: (1)  $2\text{HgS} + 3\text{SeO}_2 \longrightarrow 2\text{HgO} + 2\text{SO}_2 + 3\text{Se} - 5.4 \text{ kcal}$  (2)  $2\text{HgO} + \text{HgS} + 3\text{Se} \longrightarrow 3\text{HgSe} + \text{SO}_2 + 38.7 \text{ kcal}$ . The presence of 0.5-5% moisture in the reaction mixture lowers the initial reaction temperature from 200 to 95-100C. Traces of HgO,  $\text{HgSO}_4$  and Se (less than 0.1%) are also formed. This method is recommended for the production of HgSe.

Card 1/2

ACCESSION NR: AP4036964

HgSe has a cubic structure,  $a = 6.08 \pm 0.01 \text{ \AA}$ . There is no reaction between HgS and  $\text{H}_2\text{SeO}_3$  solution at 20-100C. Orig. art. has: 4 equations, 3 tables and 3 figures.

ASSOCIATION: None

SUBMITTED: 11Apr63

DATE ACQ: 05Jun64

ENCL: 00

SUB CODE: IC

NO REF SOV: 005

OTHER: 005

Card 2/2

1-16288-65 EWT(1)/EWT(m)/EPR/EWP(t)/EEC(b)-2/EWP(b) Ps-4 IJP(c)/  
ESD(gs)/ESD(t)/AFML/AS(mp)-2/APGC(b) JD

ACCESSION NR: AP5000550

S/0051/64/017/006/0901/0907

AUTHORS: Markovskiy, L. Ya.; Orshanskaya, N. S.

TITLE: On the luminescent properties of the ZnS-MgS system when  
activated with copper 21 27 B

SOURCE: Optika i spektroskopiya, v. 17, no. 6, 1964, 901-907

TOPIC TAGS: luminescence, luminor, zinc sulfide optic material,  
copper activation, phase transformation 27

ABSTRACT: The investigated luminors were synthesized by roasting a mixture of ZnS with MgO in an atmosphere of purified nitrogen saturated with carbon disulfide. The amount of copper was 0.01% and was introduced in the form of copper chloride. The ratio of the ZnS and MgS concentration was varied in steps of 10% by weight. The luminors were synthesized at two temperatures, 900 and 1150°. The luminescence characteristics were investigated by cathode ex-

Card 1/3

1 16288-65

ACCESSION NR: AP5000556

2

citation in a dismountable cathode ray tube (9 kV,  $1 \mu\text{A}/\text{cm}^2$ ), and by photoexcitation at  $\lambda_{\text{max}} = 365 \text{ nm}$ . The spectral characteristics were measured with a UM-2 universal monochromator feeding an FEU-17 photomultiplier connected to a galvanometer. The radiation curve of the luminors agreed with that described by Froelich for a ZnS-Cu luminoir with large content of copper up to 22% MgS by weight. At a larger MgS concentration, bands due to MgS-Cu luminors are superimposed on the bands due to the (ZnS-MgS)-Cu luminoir. In the case of the luminoir synthesized at  $900^\circ$ , the radiation spectrum shifts towards the short-wave band. All luminors have a second band near 4200--4300 Å. The shift of the long-wave maximum is observed up to 60% MgS content, in which case  $\lambda_{\text{max}}$  corresponds to 4950 Å. The spectral characteristics of the different luminors, synthesized in the system, can be related with the phase transformations that occur at different component ratios. The authors thank Yu. D. Kondrashev and Yu. A. Omelchenko for help in the study of the phase

Card 2/3

L 16288-65

ACCESSION NR: AP5000550

transformations in the investigated system." Orig. art. has: 4  
figures and 2 tables.

ASSOCIATION: None

SUBMITTED: 10Oct63

ENCL: 00

SUB CODE: SS, OP

NR REF SOV: 001

OTHER: 006

Card 3/3

L 11296-65 EWP(s)/EWT(m)/EPT(n)-2/EPR/EWP(b) Ps-1/Pu-1 JD/JG/AT/WH

ACCESSION NR: AP4043760

B/0080/64/037/008/1658/1665

AUTHOR: Markovskiy, I. Ya., Belov, M. P.

TITLE: Chemical reactions in the reduction of boron oxide with magnesium <sup>(B)</sup>

SOURCE: Zhurnal prikladnoy khimii, v. 37, no. 8, 1964, 1658-1665

TOPIC TAGS: boron extraction, boron oxide reduction, boron sesquioxide reduction, magnesium boron oxide reaction, magnesium boron trioxide reduction, magnesium boron sesquioxide reduction

ABSTRACT: Reactions occurring in the reduction of  $B_2O_3$  with magnesium have been studied and the reaction products analyzed. Experiments were conducted in purified argon using powdered 98.3% pure magnesium with 1.5% oxygen and 98.7% pure boron oxide. These experiments showed that the principal reaction in the reduction of boron oxide with magnesium is:



which is accompanied, however, by side reactions. With a  $B_2O_3$  excess

Card 1/2



L 11256-65

ACCESSION NR: AP4043760

2  
In the charge, magnesium borates are formed. With an Mg excess,  $MgB_2$  is formed. In addition to a substantial quantity of  $MgB_{12}$ , compounds of boron suboxide are formed with all ratios of the components. The reaction is exothermic and results in an extensive evaporation of magnesium, while the evaporation of boron oxide is insignificant. The rate of magnesium evaporation depends upon conditions such as the quantity of the initial mixture, the shape and size of the reaction chamber, and the heating and cooling rates. The highest yield of boron is obtained with a certain excess of magnesium. This can be explained by the evaporation of a portion of the magnesium and by the formation of magnesium borides. Any further increase in the magnesium content lowers the yield of usable boron (insoluble in hydrochloric acid) because the resulting  $MgB_2$  boride is readily soluble in acid. Orig. art. has: 6 figures and 2 tables. 7

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: 31Jul63

ATD PRESS: 3104

ENCL: 00

SUB CODE: MM, GC

NO REF SOV: 012

OTHER: 009

Card 2/2

L 23518-65 EPF(o)/EPF(a)-2/EPR/EWP(j)/EWT(m)/EWP(b)/T/EWP(e)/EWP(t) Po-4/  
Pr-4/Pe-4/Pu-4 IJP(o)/RPL AT/RM/WR/WW/JD/JG  
ACCESSION NR: AP4047117 S/0080/64/037/010/2120/2126

AUTHOR: Markovskiy, L. Ya.; Vekshina, N. V.

TITLE: Certain chemical properties of the alkaline earth metal borocarbides and products of their hydrolytic decomposition \

SOURCE: Zhurnal prikladnoy khimii, v. 37, no. 10, 1964, 2120-2126

TOPIC TAGS: alkaline earth borocarbide, hydrolytic decomposition, hydrolysis, organoboron compound

ABSTRACT: The properties of the alkaline earth borocarbides  $\text{MeC}_4\text{B}_2$  were studied, especially their hydrolysis and their high temperature reactions with oxygen, carbon, nitrogen, boron and boron anhydrides. These borocarbides did not react with carbon and nitrogen at 1700-2000C. They started to oxidize at 1000C under atmospheric pressure, and were burned completely at 1300C to form the molten borates. At 1900C they reacted with B and with  $\text{B}_2\text{O}_3$ .  $\text{MeC}_4\text{B}_2 + \text{B} \rightarrow \text{MeB}_6 + \text{B}_4\text{C} + 2\text{C}$ , and  $\text{MeC}_4\text{B}_2 + \text{B}_2\text{O}_3 + \text{C} \rightarrow \text{MeB}_6 + \text{B}_4\text{C} + \text{CO}$ . The

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L 23518-65

ACCESSION NR: AP4047117

3

alkaline earth borocarbides hydrolyse slowly in water and faster in dilute acids to form complex organoboron compounds which polymerize to hard amorphous materials which were soluble only in acetone and tetrahydrofuran. The liquid organic compounds, comprising only C, B, O and H, were unsaturated, with a C: H ratio of  $C_nH_{2n-2}$ , but contained no acetylenic bonds; the unsaturation was probably dienic. Hydrolytic rupture of the borocarbides was believed to have been at the C-B or B-B bonds. The presence of B in the polymeric products was attributed either to addition of  $BH_3$  radicals to fragments of the unsaturated hydrocarbon chains, or to polymerization of chain segments containing the B-C bond. The alkaline earth borocarbides were oxidized by concentrated  $HNO_3$  and  $H_2SO_4$ , reducing them to the lower nitrogen oxides and  $SO_2$ . Orig. art. has: 7 tables and 1 figure

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: 04Nov62

ENCL: 00

SUB CODE: 1C, 6C

NO REF SOV: 004

OTHER: 000

Card 2/2

L 41347-65 EWT(m)/EWP(e)/EWG(m)/EPF(n)-2/EWP(t)/EWP(b)/EPR Ps-4/Pu-4

IJP(c) JD/JG/AT/WH

ACCESSION NR: AP4047118

S/0080/64/037/010/2126/2133

33  
32  
B

AUTHOR: Markovskiy, L. Ya.; Vekshina, N. V.

TITLE: Alkaline earth metal borocarbides

SOURCE: Zhurnal prikladnoy khimii, v. 37, no. 10, 2126-2133

TOPIC TAGS: alkaline earth borocarbide, synthesis, property, thermal stability, hydrolysis, organoboron compound

ABSTRACT: The conditions for making Ca, Sr and Ba borocarbides and properties of these  $\text{MeC}_2\text{B}_2$  borocarbides were investigated. The alkaline earth metals form with B and C a low temperature phase borocarbide  $\text{MeC}_2\text{B}_2$  and a high temperature (1900-2000C) phase having the composition  $\text{MeC}_4\text{B}_2$ . The  $\text{MeC}_4\text{B}_2$  compounds crystallize as shiny dark cinnamon colored grains, melt in the  $2200 \pm 100\text{C}$  range, are thermally stable in atmospheric oxygen to 200C, and decompose at higher temperatures (or at reduced pressure at 1300C) to the borides, boron carbide and carbon. They hydrolyse in moist air and more rapidly in water, and

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L 41347-65

ACCESSION NR: AP4047118

decompose completely in acid to form liquid and solid polymeric organoboron compounds containing up to 10% B, saturated and unsaturated hydrocarbons and boron hydrides and hydrogen. In addition to elemental synthesis, the alkaline earth borocarbides were formed under all other conditions when reaction between B, C and the alkine earth metals is possible: by reaction of the  $MeC_2$  carbides with  $B_2O_3$ , elemental B or boron carbide; by the reduction of the Ca, Sr, or Ba oxides with boron carbides and carbon; or by the thermal carbon reduction of a mixture of boron oxides and the alkaline earth metal. "The authors thank Yu. D. Kondrashev for conducting the x-ray analysis of the borocarbide samples." Orig. art. has: 6 tables and 7 equations.

ASSOCIATION: None

SUBMITTED: 04Nov62

ENCL: 00

SUB CODE: IC, GC

NO REF SOV: 011

OTHER: 001

Cord 2/2 *ee*

L 16792-66 EWT(1) IJP(c)

ACC NR: AP6002534

SOURCE CODE: UR/0286/65/000/023/0037/0037

AUTHORS: Kolpakova, A. A.; Markovskiy, L. Ya.

ORG: none

TITLE: A method for obtaining a luminophor based on strontium orthosilicate.  
Class 22, No. 176651 [announced by State Institute of Applied Chemistry  
(Gosudarstvennyy institut prikladnoy khimii)]

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 23, 1965, 37

TOPIC TAGS: luminophor, strontium compound, cerium

ABSTRACT: This Author Certificate presents a method for obtaining a <sup>21,44,55</sup>luminophor based on strontium orthosilicate. The process calls for the use of an activator and for heating the charge. To obtain a luminophor radiating in the violet region of the spectrum and with a high temperature resistance of radiation, trivalent cerium is used as the activator.

SUB CODE: 07/ SJRM DATE: 20Mar63

Cord 1/15M

UDC: 621.3.032.35:661.843

2



L 34505-55 EWT(m)/EWG(m)/EWP(t)/EWP(b) IJP(c) RDW/JD

ACCESSION NR: AP5002803

S/0078/65/010/001/0166/0171  
12  
13  
BAUTHOR: Markovskiy, L. Ya.; Smirnova, R. I.

TITLE: Chemical reactions occurring during the interaction of lead sulfide with selenious anhydride and selenious acid

SOURCE: Zhurnal neorganicheskoy khimii, v. 10, no. 1, 1965, 166-171

TOPIC TAGS: lead sulfide, selenious anhydride, selenious acid, reaction, lead selenide formation, lead oxide formation, lead sulfate formation

ABSTRACT: The reactions of PbS with SeO<sub>2</sub> and with H<sub>2</sub>SeO<sub>3</sub> were studied. Thermographic studies showed that reaction between PbS and SeO<sub>2</sub> starts at 80C and is accompanied by significant exothermic effects caused mainly by the oxidation to PbS:  $2\text{PbS} + 3\text{SeO}_2 \rightarrow 2\text{PbO} + 2\text{SO}_2 + 3\text{Se}$ , and  $\text{PbS} + 2\text{SeO}_2 \rightarrow \text{PbSO}_4 + 2\text{Se}$ . The presence of PbSe in the reaction products should be considered primarily the result of the secondary reaction  $2\text{PbO} + \text{PbS} + 3\text{Se} \rightarrow 3\text{PbSe} + \text{SO}_2$ . In addition, the principal reaction is complicated by a whole series of other secondary reactions:



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L 34505-65

ACCESSION NR: AP5002803

and also by the reaction between  $\text{PbSeO}_3$  and  $\text{PbS}$ .  $\text{PbS}$  reacts on heating with aqueous solutions of  $\text{H}_2\text{SeO}_3$ :  $2\text{PbS} + 3\text{H}_2\text{SeO}_3 \rightarrow 2\text{PbSeO}_3 + 2\text{S} + \text{Se} + 3\text{H}_2\text{O}$ . There is a rough analogy between the properties of  $\text{PbS}$  and the sulfides of zinc and cadmium in their reaction with selenious anhydride and selenious acid solution, only heat and sufficiently concentrated  $\text{H}_2\text{SeO}_3$  being required for the reactions to proceed at significant rates. Orig. art. has: 3 tables, 3 figures, and 9 equations.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii, Leningrad (State Institute of Applied Chemistry)

SUBMITTED: 03Aug63

ENCL: 00

SUB CODE: GC

NO REF SOV: 010

OTHER: 002

Card 2/2



L 36705-65 EPP(c)/EPR/ENG(j)/ENT(m)/ESP(b)/EWP(e)/EWP(t) Pr-1/Ps-1 IJP(c)

ACCESSION NR: AP5003116

S/0080/65/038/001/0017/0022

AUTHOR: Belov, M. P.; Markovskiy, L. Ya.

TITLE: Magnesium-thermic method of determining oxygen impurities in elemental boron

SOURCE: Zhurnal prikladnoy khimii, v. 38, no. 1, 1965, 17-22

TOPIC TAGS: oxygen determination, magnesium, thermic reaction, boron analysis, boron purity

ABSTRACT: Optimum conditions were determined for the determination of oxygen in elemental boron by calcining the sample to be analysed with metallic magnesium in an inert atmosphere. Powdered Mg was mixed with the B in at least a 1:1 wt. ratio (less Mg increased the error in the analysis), the mixture was calcined under argon at 1120-1130C for 10 minutes, the temperature was reduced to 900C and the Mg was vacuum distilled for 1 hour. Argon was added, the system was cooled to room temperature and the MgO was extracted with 0.5N HCl for 0.5 hours. Oxygen content in the boron was calculated from the amount of

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I 36705-65

ACCESSION NR: AP5003118

Mg in the extraction filtrate. This relatively simple method for oxygen determination has a sensitivity of 0.01% (using Trilon B indicator) and an accuracy of 8-10%. Orig. art. has: 4 tables and 2 figures

ASSOCIATION: None

SUBMITTED: 31 Jan 64

ENCL: 00

SUB CODE: GC

NR REF SOV: 008

OTHER: 008

Card 2/2

L 27619-65 EWP(e)/EWP(w)/EWT(m)/EFT(c)/EMA(d)/EPP(n)-2/EWP(t)/T/EWP(j)/EPR/EWP(b)  
 PC-1/Pr-1/Ps-1/Pu-1 IJP(c)/RPL JD/WH/JG/AT/RM/WH 8/0080/65/038/002/0245/0251  
 ACCESSION NR: AP5005563

AUTHOR: Markovskiy, L. Ya.; Vekshina, N. V.; Pron', G. F.

TITLE: Lanthanum borocarbides

SOURCE: Zhurnal prikladnoy khimii, v. 38, no. 2, 1965, 245-251

TOPIC TAGS: Rare earth borocarbide, lanthanum borocarbide, high temperature borocarbide, borocarbide preparation, borocarbide hydrolysis, borocarbide thermal dissociation

ABSTRACT: The preparation and physicochemical properties of the high-temperature phase of lanthanum borocarbide,  $\text{LaC}_2\text{B}_2$ , have been studied because of the importance of the rare-earth compounds with boron and carbon for various processes such as the formation of polymerizable organoboron compounds by hydrolysis of borocarbides. A product containing 93-96%  $\text{LaC}_2\text{B}_2$  was prepared by sintering in reducing atmosphere at 1900C the following mixtures: 1) lanthanum metal, boron, and carbon; or 2) boron carbide, carbon, and lanthanum metal, lanthanum oxide, or lanthanum carbide; or 3) lanthanum carbide, carbon, and boron or boron oxide ( $\text{B}_2\text{O}_3$ ). Thermal reduction with carbon of a mixture of lanthanum and boron oxides produced either a mixture of  $\text{LaC}_2\text{B}_2$  (up to 70%) and  $\text{LaB}_6$ , or pure  $\text{LaB}_6$ . The products of all reactions studied

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L 27619-65

ACCESSION NR: AP5005563

were determined by elemental and phase chemical analysis and x-ray powder diffraction. The analytical methods were described. The phase determination was made by analyzing the solution, residue, and gas produced by hydrolysis (with hydrochloric acid) of the sintered products. The products of sintering were composed of borocarbides, lanthanum hexaboride ( $\text{LaB}_6$ ), carbon, and, occasionally, lanthanum carbide ( $\text{LaC}_2$ ) or boron carbide ( $\text{B}_4\text{C}$ ). The optimum La:C:B ratio in the starting mixture producing  $\text{LaC}_2\text{B}_2$ , exclusive of other borocarbide phases, was found to be 1:4:2. Other [unspecified] borocarbide phases were detected in the sintered mass obtained with different La:C:B ratios. Pure  $\text{LaC}_2\text{B}_2$  was a polycrystalline cake which decomposed on heating up to its melting point (over 2000°C) and was completely hydrolyzed by HCl with the formation of solid, liquid, and gaseous organic compounds, as in the hydrolysis of alkaline earth borocarbides. Experimental data confirmed the existence of the cerium, praseodymium, neodymium, samarium, europium, and gadolinium borocarbides, analogous to lanthanum borocarbide and alkaline earth borocarbides, which are completely dissociated at high temperature in vacuum. Orig. art. has: 2 figures and 5 tables. [JK]

ASSOCIATION: none

Cord 2/3

L 27619-65  
ACCESSION NR: AP5005563

SUBMITTED: 18Jan63

NO REF SOV: 009

ENCL: 00

OTHER: 000

SUB CODE: GC, MI

ATD PRESS: 3190

Card 3/3



L 32662-65 EWP(m)/EWP(t)/EWP(b) IJP(c) JD/JG  
 ACCESSION NR: AP5005571 S/0080/65/038/002/0411/0414

18  
17  
6

AUTHOR: Markovskiy, L. Ya.; Pesina, E. Ya.; Smirnova, R. I.

TITLE: The use of carbon disulfide as a sulfiding agent in the synthesis of rare earth sulfides

SOURCE: Zhurnal prikladnoy khimii, v. 38, no. 2, 1965, 411-414

TOPIC TAGS: sulfiding, carbon disulfide, rare earth sulfide, cerium sulfide, lanthanum sulfide

ABSTRACT: Cerium dioxide ( $\text{CeO}_2$ ) and lanthanum sesquioxide ( $\text{La}_2\text{O}_3$ ) were sulfided under laboratory conditions with carbon disulfide to optimize the process efficiency and product quality as compared with the conventional sulfidation with hydrogen sulfide. The process was shown to be thermodynamically more favorable than  $\text{H}_2\text{S}$  sulfidation and the oxides were treated in a simple flow reactor in a carbon disulfide-saturated stream of nitrogen at 800-1100C. Stoichiometric compositions of the sesquisulfide  $\text{Ce}_2\text{S}_3$  were reached with  $\text{CS}_2$  in 120 min. at 900-1000C, while the reaction with  $\text{H}_2\text{S}$  gave a composition of approximately 95%  $\text{Ce}_2\text{S}_3$  after 240 min. at 1000-1100C. The theoretical composition of  $\text{La}_2\text{S}_3$  was obtained with  $\text{CS}_2$  after

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L 32662-65

ACCESSION NR: AP5005571

90 min. at 1000C. Samarium and praseodymium oxides were also sulfidized with good results with CS<sub>2</sub>. Orig. art. has: 4 tables and 1 figure.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State applied chemistry institute)

SUBMITTED: 25Jan63

ENCL: 00

SUB CODE: IC

NO REF SOV: 009

OTHER: 010

Card 2/2

L 51844-65 EWI(m)/EWG(m)/EWP(t)/ENP(b) IJP(c) RDW/JD/JG

ACCESSION NR: AP5011809

UR/0080/65/038/005/0717/0720  
546.23+546.65AUTHOR: Markovskiy, L. Ya.; Soboleva, M. S.; Sapozhnikov, Yu. P.TITLE: Preparation of rare earth selenides by reduction of selenitesSOURCE: Zhurnal prikladnoy khimii, v. 38, no. 4, 1965, 717-720

TOPIC TAGS: rare earth compound, selenide, lanthanum compound, cerium compound, praseodymium compound, gadolinium compound, neodymium compound, reduction method

ABSTRACT: Selenites of lanthanum, cerium, praseodymium, neodymium, samarium, and gadolinium were reduced with a mixture of hydrogen and hydrogen selenide at 600°C, forming selenides of the general formula  $M_2Se_3$ . Hydrogen selenide was used to minimize the formation of oxyselenides, which were present in the reaction products when hydrogen alone was used. X-ray phase analysis of all products showed various selenide phases in the case of each rare metal. The powder figures for lanthanum and samarium polyselenides had the same system of lines and nearly the same intensities, but differed in interplanar distances. Such distances for the powder patterns of polyselenides of cerium and the other rare earth elements occupy an inter-

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L 51844-65

ACCESSION NR: AP5011809

mediate position between the polyselenides of lanthanum and samarium. The patterns for sesquiselenides are very similar to those of the corresponding polyselenides. A comparison of the experimental interplanar distances with those in the literature shows contradictions. The proposed method is suitable for the preparation of high-purity rare earth selenides which can be used as semiconductors and luminescent materials. "In conclusion, the authors express their gratitude to Yu. D. Kondrashev for assistance in taking the powder patterns and for a number of valuable suggestions." Orig. art. has: 1 figure, 2 tables.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: 21May63

ENCL: 00

SUB CODE: IC

NO REF SOV: 004

OTHER: 005

Card 2/2

SAPOZHNIKOV, Yu.P.; MARKOVSKIY, L.Ya.

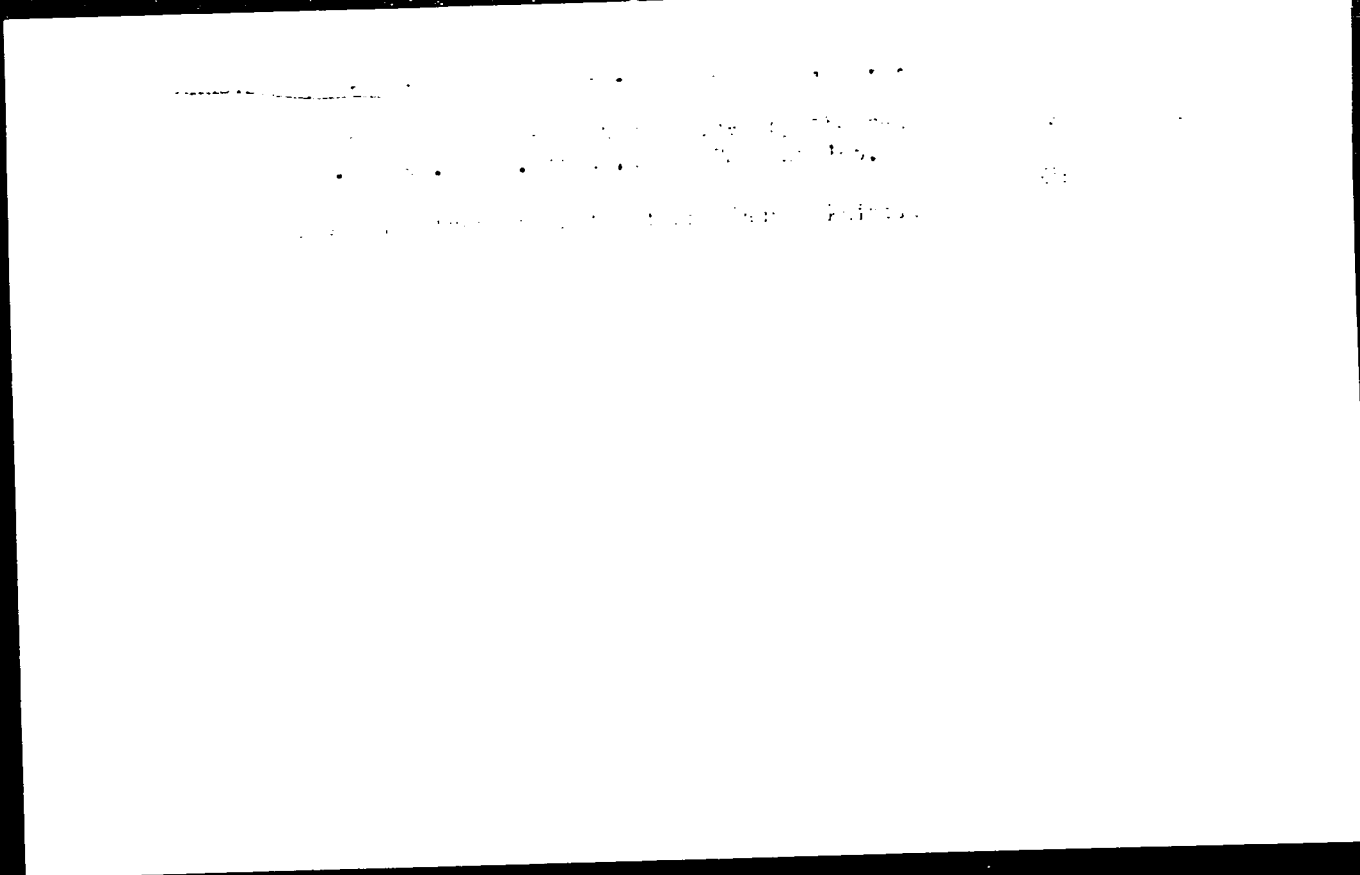
Composition and certain properties of mercury selenite.  
Zhur. neorg. Khim. 10 no.6:1399-1401 Se '65.

(MIRA 18:6)

1. Gosudarstvennyy institut prikladnoy khimii.

"APPROVED FOR RELEASE: 06/14/2000

CIA-RDP86-00513R001032520006-2



APPROVED FOR RELEASE: 06/14/2000

CIA-RDP86-00513R001032520006-2"

L 63050-65 EWT(1)/EWT(m)/EWP(t)/EWP(b) P1-4 LJP(c) JD/JG 24  
 ACCESSION NR: AP5017771 UR/0080/65/038/007/1432/1436 22  
 535.37+546.42'21+546.284 B  
 AUTHOR: Kolpakova, A. A.; Markovskiy, L. Ya.  
 TITLE: Luminescent properties of the  $\text{SrO}$  - silica system activated by cerium and manganese 21 21 27  
 SOURCE: Zhurnal prikladnoy khimii, v. 38, no. 7, 1965, 1432-1436  
 TOPIC TAGS: strontium silicate, luminophor, cerium, manganese, luminescence activator  
 ABSTRACT: Phase transformations in the  $\text{SrO} - \text{SiO}_2(\text{Ce}\cdot\text{Mn})$  system are associated with changes in luminescent properties. X-ray structural and luminescence analysis showed that the  $\text{Sr}_3\text{SiO}_5$  phase does not luminesce, the  $\text{Sr}_2\text{SiO}_4$  phase causes the blue glow of the luminophor ( $\lambda_{\text{max}} = 415 \text{ m}\mu$ ), and the  $\text{SrSiO}_3$  phase forms a luminophor having a whitish-pink glow with a double-band spectrum ( $\lambda_{\text{max}1} = 400 \text{ m}\mu$  and  $\lambda_{\text{max}2} = 550 \text{ m}\mu$ ). To determine the interaction of the activators (cerium and manganese) during the luminescence of strontium silicates, absorption spectra were measured without the activators, with one activator at a time, and with both activators. It was found that manganese alone does not activate  
 Card 1/2

L 63050-65

ACCESSION NR: AP5017771

2

strontium silicates. In  $\text{SrSiO}_3\text{-Ce-Mn}$  luminophors, sensitized luminescence takes place: in addition to the blue glow of cerium (cerium band with  $\lambda_{\text{max}} = 400 \text{ m}\mu$ ), there is a transfer of energy to the manganese centers which causes the appearance of a manganese band with  $\lambda_{\text{max}} = 550 \text{ m}\mu$ . To determine the possibility of increasing the radiation intensity of  $\text{Sr}_2\text{SiO}_7\text{-Ce-Mn}$  and  $\text{SrSiO}_3\text{-Ce-Mn}$  luminophors, the optimum concentrations of the activators and fluxes and the temperature and duration of the firing were established. "In conclusion, the authors thank Yu. D. Kondrashev for carrying out the x-ray structural study of the samples."

Orig. art. has: 2 figures and 2 tables.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: 06May63

ENCL: 00

SUB CODE: IC, OP

NO REF SOV: 004

OTHER: 005

Card

L 1614-66 EWP(e)/EWT(m)/EWP(i)/ETC/ENG(mi)/EWP(t)/EWP(k)/EWP(z)/EWP(b) IJP(c)  
JD/JG/AT/WH

ACCESSION NR: AP5021662

UR/0080/65/038/008/1677/1682  
669.018+546.271

AUTHOR: Markovskiy, L. Ya.; Bezruk, Ye. T.

TITLE: Fusibility diagram and some chemical properties of borides in the man-  
gane boron system

SOURCE: Zhurnal prikladnoy khimii, v. 38, no. 8, 1965, 1677-1682

TOPIC TAGS: manganese, boron, boride, oxygen, nitrogen, ammonia, carbon,  
phase diagram

ABSTRACT: The work is intended as a study of the chemical properties of indi-  
vidual boride phases, particularly their interaction with oxygen, nitrogen, ammonia,  
and carbon. Manganese borides were prepared by sintering briquetted mixtures  
of powders of electrolytic manganese (99.5% manganese) and refined boron  
(98.5%) in corundum furnaces in an atmosphere of purified argon. Temperature  
limits for the formation of different boron phases, sintering conditions and com-  
position of the samples are given in tabular form. After heating, the samples  
were cooled along with the furnace. The following boride phases were observed:  
 $Mn_2F$ ,  $MnB$ ,  $Mn_3B_4$ , and  $MnB_2$ . In long term tests with a large excess of metal-

Cord 1/2

L 1614-66

ACCESSION NR: AP5021662

lic manganese in the initial mixture (heating at 1000-1150 C for 15 hours), with slow cooling as well as with rapid quenching, a mixture of  $MnB_2$  and metallic boron was obtained. The fusion temperatures of the system are shown graphically. Specific density of the borides was as follows:  $Mn_2B$ -7.21,  $MnB$ -6.35,  $Mn_3B_4$ -5.95, and  $MnB_2$ -4.90. With oxygen, noticeable oxidation of the manganese borides started at 600C, while with nitrogen, nitriding started at about 700C. With carbon, signs of carbonization of the borides were observed at 1500C only for  $Mn_2B$ . For the other borides, no carbide phases were observed even at 1800C. However, in contact with carbon at high temperatures, all the borides are transformed into the monoboride phase  $MnB$ , evidently the most stable in this medium. The experimental results are found to be in good agreement with the results of investigations of the hydrolytic stability of manganese borides, as well as of borides of other transition metals. Orig. art. has: 3 figures and 5 tables

ASSOCIATION: Gosudarstvennyi institut prikladnoi khimii (State Institute of Applied Chemistry)

SUBMITTED: 27 May 63

NR REF SOV: 006

Cord 2/2

ENCL: 00

OTHER: 016

SUB CODE: MM, GC

10992-66 EWT(m)/ETC(F)/EWG(m)/EWP(t)/EWP(b) IJP(c) RDW/JD/JG  
 ACC NR AP6000680 SOURCE CODE: UR/0080/65/038/009/1945/1949  
 AUTHOR: Markovskiy, L. Ye.; Vekshina, N. V.  
 ORG: State Institute for Applied Chemistry, Leningrad (Gosudarstvennyy institut prikladnoy khimii)  
 TITLE: A new boride phase with a high metallic content in the lanthanum-boron system  
 SOURCE: Zhurnal prikladnoy khimii, v. 38, no. 9, 1965, 1945-1949  
 TOPIC TAGS: lanthanum compound, boron compound, phase analysis  
 ABSTRACT: The article describes the use of hydrolytic separation for the discovery of new boride phases of lanthanum. Reaction of lanthanum and boron was carried out by the sintering of a pressed mixture of their powders at temperatures from 800 to 1300°. The powders used were prepared from ingots containing 99.8% lanthanum and 99% pure finely crystalline boron obtained by the refining of amorphous boron in vacuum at 2000°. The reaction products were subjected to x-ray examination and to chemical phase analysis. Experiments showed that LaB<sub>4</sub> and LaB<sub>6</sub> are practically insoluble in very dilute hydrochloric acid, and that only lanthanum tetraboride is dissolved during boiling. Lanthanum hexaboride  
 Cord1/2 UDC: 546.654.261.271



L 10992-66

ACC NR: AP6000680

(like  $\text{LaB}_4$ ) is readily soluble in nitric acid. Based on this fact, samples were treated for about one hour in dilute hydrochloric acid (1:10) until the dissolving stopped. The solid residue obtained was further treated with boiling concentrated hydrochloric acid and the product, insoluble in the hydrochloric acid, was treated with strong nitric acid. The solutions obtained were analyzed for boron and lanthanum. The experiments showed that, during the reaction with weak hydrochloric acid of a number of samples obtained by the sintering of metallic lanthanum with boron, there is observed an energetic reaction accompanied by the evolution of boron hydrides. The experimental data indicate that the amounts of lanthanum and boron in the solution correspond to the ratio  $\text{La:B} = 2:1$ . This ratio is maintained over a wide range of lanthanum and boron concentrations in the original charge. Analysis indicates that, in addition to the known borides-- $\text{LaB}_4$  and  $\text{LaB}_6$ , there exists also a lower boride of the composition  $\text{La}_2\text{B}_4$ . In distinction from the hexaboride, this compound is readily soluble in very dilute hydrochloric acid with the evolution of a large amount of boron hydrides up to 8%. It has been established that, in the series  $\text{La}_2\text{B}-\text{LaB}_4-\text{LaB}_6$ , the chemical stability of the borides increases with the boron content in the boride phase. The highest boride content,  $\text{La}_2\text{B}$ , in the melts is attained with a ratio in the reaction mixture equal to  $\text{La:B} = 1:2$  and a calcining temperature of  $800^\circ$ . Orig. art. has: 1 figure and 4 tables.

SUB CODE: 07/ SUBM DATE: 02Aug63/ ORIG REF: 006/ OTH REF: 006

L 16051-66 EWP(e)/EWT(m)/EWP(t) IJP(c) JD/JG

ACC NR: AP6005515

SOURCE CODE: UR/0080/66/039/001/0013/0020

AUTHOR: Markovskiy, L. Ya.; Vekshina, N. V.; Kondrashev, Yu. D.; Stroganova, I. M.

ORG: none

TITLE: Ternary compounds in the beryllium-boron-carbon system

SOURCE: Zhurnal prikladnoy khimii, v. 39, no. 1, 1966, 13-20

TOPIC TAGS: beryllium compound, boron compound, carbide, crystal structure

ABSTRACT: To study the reaction of beryllium with boron and carbon, powder mixtures of the components were sintered at 1200-2000°C, and the products were subjected to x-ray and chemical phase analysis. The data showed the existence of two beryllium borocarbides,  $\text{BeC}_2\text{B}_2$  and  $\text{BeC}_2\text{B}_{12}$ . The structure of  $\text{BeC}_2\text{B}_2$ , (studied by the single crystal method) is characterized by a hexagonal system, Laue class  $\frac{6}{m}$ , and lattice constants  $a = 10.84$  and  $c = 6.18$ . The structure of  $\text{BeC}_2\text{B}_{12}$ , (studied by the powder method) belongs to the  $\text{B}_4\text{C}(\text{B}_{12}\text{C}_3)$  structural type. The lattice constants are  $a = 5.615$ ,  $c = 12.28 \text{ \AA}$ ,  $c/a = 2.187$ . It is shown that in contrast to alkaline earth and rare earth borocarbides, beryllium borocarbides are chemically stable compounds and

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L 16051-66

ACC NR: AP6005515

do not undergo hydrolytic decomposition. Ternary compounds of beryllium with boron and carbon form from the elements and also as a result of the reaction of beryllium borides, beryllium carbide  $\text{Be}_2\text{C}$ , and boron carbide with one another as well as with elemental carbon, boron, and beryllium respectively. Orig. art. has: 1 figure and 6 tables.

SUB CODE: 07/ SUBM DATE: 07Oct63/ ORIG REF: 011/ OTH REF: 009

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Card 2/2

L 41633-66 EWT(m)/EWP(e)/T/EWP(t)/ETI LJP(c) JD/JG/AT/WE  
ACC NR: AP6008263 SOURCE CODE: UR/0080/66/039/002/0258/0265

AUTHOR: Markovskiy, L. Ya.; Bezruk, Ye. T.

ORG: State Institute of Applied Chemistry, Leningrad (Gosudarstvennyy institut prikladnoy khimii)

TITLE: Boron carbides of manganese

SOURCE: Zhurnal prikladnoy khimii, v. 39, no. 2, 1966, 258-265

TOPIC TAGS: boron compound, manganese compound, crystal lattice structure, ferromagnetic material, CARBIDE, INORGANIC SYNTHESIS

ABSTRACT: The present work is a continuation of the authors' earlier investigations of the synthesis of boron carbides of manganese (cf: ZhPKh, XXXV, 491, 1962; XXXVIII, 8, 1677, 1965).  $Mn_7BC_2$  (I) and  $Mn_4BC$  (II) can be synthesized from their respective elements, from the reaction of manganese borides with carbon and manganese carbide, or from the reaction of manganese carbide with boron and boron carbide. (I) appears in the form of needle-like crystals in microphotographs and has a light gray metallic color. It has a specific gravity of 7.43, is ferromagnetic (specific electrical resistance is  $1 \cdot 10^{-3} \Omega/cm$ ), and is thermally stable up to  $2000^\circ$ . Synthesis of (I) occurs in the temperature range  $1150-2000^\circ C$ . (II) consists of gray crystals with an appearance similar to (I). (II) has a specific gravity of 7.33, is not ferromagnetic (specific

UDC: 546.711'27'261

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ACC NR: AP6008263

electrical resistance is  $6 \cdot 10^{-4} \Omega/\text{cm}$ ), and at temperatures higher than  $1300^\circ\text{C}$ , (II) is converted into (I). Synthesis of (II) occurs in the temperature range of  $1150-1300^\circ\text{C}$ . Both (I) and (II) are markedly unstable in cold water, decomposing to gas and organic liquid products. The authors thank Yu. D. Kondrashev for calculating the lattice parameters for  $\text{Mn}_7\text{BC}_2$ . Orig. art. has: 8 tables, 2 figures.

SUB CODE: 11,20/

SUBM DATE: 24Jul64/

ORIG REF: 007/

OTH REF: 008

Card 2/2 af

L 04733-67 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6027008

SOURCE CODE: UR/0080/66/039/005/0973/0977

AUTHOR: Markovskiy, L. Ya.; Vekshina, N. V.; Kondrashev, Yu. D.

32

ORG: none

13

TITLE: Chromium borocarbide

SOURCE: Zhurnal prikladnoy khimii, v. 39, no. 5, 1966, 973-977

TOPIC TAGS: chromium compound, chromium carbide, boron compound, carbon compound, phase composition, X ray diffraction pattern

ABSTRACT: The phase compositions of the reaction products of chromium with boron and carbon in the Cr-B-C system were studied. The existence of the ternary compound, chromium borocarbide,  $\text{Cr}_7\text{BC}_4$  was established: rhombic,  $a = 2.86\text{\AA}$ ,  $b = 9.22\text{\AA}$ ,  $c = 6.95\text{\AA}$ . Powder pattern data is given. When the molar ratio of Cr in Cr:B:C is small,  $\text{CrB}$  and  $\text{CrB}_2$  are formed; as Cr content is increased the carbides  $\text{Cr}_3\text{C}_2$  and  $\text{Cr}_7\text{C}_3$  are formed. It was established that all chromium carbides react with boron and with borides forming either solid solutions based on  $\text{Cr}_7\text{C}_3$  or  $\text{Cr}_3\text{C}_2$  or the borocarbide  $\text{Cr}_7\text{BC}_4$ . Chromium mono- and diborides are characterized by high stability with respect to carbon. The lower borides,  $\text{Cr}_2\text{B}$  in particular, are converted in the presence of carbon at

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ACC NR: AP6027008

high temperatures to carbides containing up to 10 at.% boron and the  
boride CrB. Orig. art. has: 4 tables. D

SUB CODE: 07/ SUBM DATE: 17May65/ ORIG REF: 004/ OTH REF: 004

Card 2/2 *egh*

ACC NR: AP7003144

(V)

SOURCE CODE: UR/0080/66/039/012/2820/2821

AUTHOR: Markovskiy, L. Ya.; Soboleva, M. S.

ORG: none

TITLE: Synthesis of gallium and indium selenides by selenite reduction

SOURCE: Zhurnal prikladnoy khimii, v. 39, no. 12, 1966, 2820-2821

TOPIC TAGS: chemical reduction, selenite reduction, indium selenide, gallium selenide, inorganic synthesis

ABSTRACT:

Application of the method of selenite reduction by hydrogen for preparation of stoichiometric indium selenide,  $\text{In}_2\text{Se}_3$  and gallium selenide,  $\text{Ga}_2\text{Se}_3$  has been studied in connection with the development of this method for preparation of the selenides of II—IV group metals. Stoichiometric  $\text{In}_2\text{Se}_3$  and  $\text{Ga}_2\text{Se}_3$  were obtained by reduction with a hydrogen-hydrogen selenide mixture of  $\text{In}_2\text{O}_3 \cdot 3.6\text{SeO}_2 \cdot 4\text{H}_2\text{O}$  and  $\text{Ga}_2\text{O}_3 \cdot 3.5\text{SeO}_2 \cdot 4\text{H}_2\text{O}$  at 500—600C. Only stoichiometric  $\text{In}_2\text{Se}_3$  was prepared by reduction of the corresponding selenite with pure hydrogen at 350C under specified conditions. Hydrogen reduction of gallium selenite at 300—600C produced, regardless of duration, only impure gallium selenide contaminated with gallium oxides. Orig. art. has: 2 tables.

SUB CODE: 07/ SUBM DATE: 04Dec65/ ORIG REF: 011/ OTH REF: 003/ ATD PRESS: 5112  
Card 1/1 UDC: 546.681'682'23



ACC NR: AP7004395

SOURCE CODE: UR/0226/67/000/001/0037/0039

AUTHOR: Markovskiy, L. Ya.; Bezruk, Ye. T.

ORG: State Institute of Applied Chemistry, Leningrad (Gosudarstvennyy institut prikladnoy khimii).

TITLE: Micromethod for determining the melting points of refractory compounds

SOURCE: Poroshkovaya metallurgiya, no. 1, 1967, 37-39

TOPIC TAGS: refractory compound, melting point, test method, micromethod

ABSTRACT: A description is given of a new micromethod for determining the melting points of refractory-compounds on small test pieces measuring 2—3 m.m. The method is a variation of the Galakhov method and makes it possible to measure melting points in an inert medium at temperatures up to 2500 C. The heater is a tube made of tungsten foil. The method has been tested on a number of compounds with known melting points. Orig. art. has: 1 figure and 1 table. [Authors' abstract] [AM]

SUB CODE: 11/SUBM DATE: 09Aug66/ORIG REF: 005/OTH REF: 001/

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L 10598-65 EMP(a)/EMP(g)/EMP(b) Pr. 4 RDW/JD

ACCESSION NR: AT4044994

B/3110/64/000/051/0030/0033

TITLE: The reduction of mercuric selenite with hydrogen 27

AUTHOR: Markovskiy, L. Ya.

SOURCE: Leningrad. Gosudarstvennyy institut prikladnoy khimii. Trudy, no. 51, 1964. Khimiya i tekhnologiya lyuminofov (Chemistry and technology of luminophors), 30-33

TOPIC TAGS: luminophor, mercuric selenide, mercuric selenite, mercuric selenite reduction 27 27

ABSTRACT: Mercuric selenite exists in the  $\alpha$ -,  $\beta$ - and  $\gamma$ -forms of  $\text{HgSeO}_3$  and as  $3\text{HgSeO}_3 \cdot \text{H}_2\text{SeO}_3$ . In the present paper, the authors studied the phase composition, thermal behavior and reduction of mercuric selenite prepared by the reaction of excess selenious acid with mercuric nitrate or acetate (for neutral mercuric selenite) and mercuric oxide (for the acid form). The  $\alpha$ - and  $\beta$ -forms of neutral mercuric selenite and the acid form were found to yield the  $\gamma$ -form on heating at 360, 400 and 310°C, respectively. In a series of experiments with the various forms of mercuric selenite, reduction with  $\text{H}_2$  (8-10 liters/hr.), was carried out at 200-600°C. The results showed that, as in the case of other selenides, pure

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ACCESSION NR: AT4044994

mercuric selenide can be obtained with the aid of hydrogen at 400-450C. The reduction takes place in both the solid and vapor phase and yields pure HgSe. The deficiency of this method is that due to the volatility of mercuric selenite and selenide, the product can only be obtained as a sublimate on the walls of the reaction vessel. This complicates the process considerably. Orig. art. has: 1 table.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii, Leningrad (State Institute of Applied Chemistry)

SUBMITTED: 00

ENCL: 00

SUB CODE: IC

NO REF SOV: 007

OTHER: 002

Card

2/2

SAUSHEV, V.S.; BYCHKOVA, N.M.; MARKOVSKIY, N.G.; KHOMENKO, M.S.

Temperature of ignition of high-molecular substances and their  
heat of combustion. Pozh. bezop. no.4:87-90 '65.

(MIRA 19:1)

MARKOVSKIY, N.

2156. GEOPHYSICAL SERVICE OF THE COAL INDUSTRY AND ITS TASKS.  
Markovskii, N. I. (Ugol (Coal), Jan. 1951, 36-37).

Geophysical methods are described briefly. Achievements of the service in the U.S.S.R. during the five years of its existence are outlined. It is suggested that a scientific research institute should be formed to deal with this type of prospecting. (1).

**MARKOVSKIY, N.I.**

Paleogeography of the Lower Viscaan Stage in the Middle Volga  
region. Dokl.AN SSSR 104 no.4:601-604 O '55. (MIRA 9:2)

1.Vsesoyuznyy nauchno-issledovatel'skiy ugol'nyy institut.  
Predstavleno akademikom S.I.Mironovym.  
(Volga Valley--Paleogeography)

15-57-1-877D  
Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 1,  
p 138 (USSR)

AUTHOR: Markovskiy, N. I.

TITLE: Estimates of Coal and Oil Contained in the Lower  
Carboniferous Clastic Stratum of the Central Volga  
and trans-Volga Regions (Perspektivy uglenosnosti  
i neftenosnosti terigennoy tolshchi nizhnego karbona  
Srednego Povolzh'ya i Zavolzh'ya)

ABSTRACT: Bibliographic entry on the author's dissertation for  
the degree of Candidate of Geological and Mineralogical  
Sciences, presented to the Moscow Geological Prospec-  
ting Institute (Mosk. geol-razved. in-t), Moscow,  
1956.

ASSOCIATION: Mosk. geol-razved. in-t (Moscow Geological  
Prospecting Institute)

Card 1/1

MARKOVSKIY, N.I.

Coal-bearing possibilities of the lower Carboniferous in the middle Volga Valley and the trans-Volga region. Trudy Lab. geol.ugl. no.6:366-378 '56. (MLRA 10:2)

1. Vsesoyuznyy nauchno-issledovatel'skiy ugol'nyy institut. (Volga Valley--Coal geology)